Managing Syncope/Collapse in the Emergency Department

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SYNCOPE: An Evidence-Based Approach – 2nd Edition

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Statement of any Conflict of interest: MR has been supplied with Zio XT monitors and ECG analysis services free of charge for research purposes from iRhythm Technologies between 2015 and 2017. MR has received funds for consultation from Medtronic Inc in 2018. MR was a Task Force member for the diagnosis and management of syncope of the European Society of Cardiology (ESC) published in March 2018. The Emergency Medicine Research Group Edinburgh has received sponsorship for the EMERGE10 conference in 2018 from various companies including Medtronic Inc, AliveCor and iRhythm Technologies. MR is supported by an NHS Research Scotland Career Researcher Clinician award.

Key Words……. Syncope; Emergency Department; Hypotension, Orthostatic; Syncope, Vasovagal; Arrhythmias, Cardiac

Brief Summary

This chapter focuses on the management of syncope and collapse in the Emergency Department (ED). Syncope is a common reason for ED attendance and it presents a major management challenge with regard to the appropriate workup and disposition. Initially a diagnosis of syncope should be made considering other syncope mimics that can present with Transient Loss Of Consciousness (TLoC) especially seizure, and other causes of collapse such as presyncope, lightheadedness, vertigo, disequilibrium and mechanical fall. Once the presenting syndrome of syncope is established, the current suggested approach to the syncope patient as advocated by the 2018 European Society of Cardiology (ESC) syncope guidelines should be followed. If no obvious underlying cause for the event is found, risk stratification should be undertaken to determine which patients likely have benign causes of syncope and which are at high risk of short-term and long-term adverse outcome. Red flag symptoms should be checked and driving, working, and avocational implications should be fully considered according to local protocols. The benefits of a hospital syncope clinical decision unit and a rapid access syncope clinic include reduced admissions, reduced length of hospital stay and reduced hospital costs.

(190 words)

Syncope is a common reason for Emergency Department (ED) attendance. It can present a major challenge in terms of appropriate work-up and disposition. Nearly 50% of patients are admitted to hospital, and for many this is unnecessary. In March 2018, the European Society of Cardiology (ESC) launched a new version of their guidelines for the diagnosis and management of syncope. **[1]** These syncope guidelines have multidisciplinary representation including for the first time, Emergency Medicine.

The guidelines have three main new focuses. Firstly, for the first time there is a section on the management of people presenting to the Emergency Department (ED) with syncope. This section describes how to diagnose syncope, rule out serious underlying diagnoses (both non-cardiovascular and cardiovascular), and if the cause of the patient's syncope remains undiagnosed, to risk stratify the patient according to the likely diagnosis. A patient likely to have a reflex or postural syncope will be at low risk of a serious outcome (although collapse in the elderly is associated with increased risk of adverse outcome). However, a patient likely to have cardiac syncope will be at high risk of a serious outcome. Management should then be based on the outcome of this risk assessment.

Previous ESC and NICE guidelines have attempted to aid the clinician in assessing the likely cause and risk, but the new guidance is the first to very specifically guide clinicians on which patients should be deemed high risk, while also attempting to reduce hospital admission rates with alternative investigative strategies (e.g. syncope assessment/ decision units and rapid access syncope clinics). The second focus of the new guidelines is to advocate the syncope clinical decision unit, including clear recommendations as to how it should be set up. Finally, the guidelines recommend an enhanced role for prolonged ECG monitoring in patients with unexplained falls, suspected epilepsy and recurrent severe unexplained syncope.

Has my patient had syncope?

The term 'syncope' must be carefully applied. It is one of two main causes of transient loss of consciousness (TLoC). The other commonest cause for this is epileptic seizure. Differentiating the two is not always straightforward. The 2018 ESC guidelines highlight the difficulty of diagnosing TLoC as being of syncopal origin (i.e. due to cerebral hypoperfusion) in the ED.[1] The SYNcope Expert Research Group International (SYNERGI) **[2]** suggests a pragmatic definition of syncope: 'a transient loss of consciousness, associated with inability to maintain postural tone and with immediate spontaneous and complete recovery'. **[3]** A very careful history is needed to differentiate syncope from epilepsy and other non-TLoC conditions such as presyncope, lightheadedness, vertigo, disequilibrium, and accidental or mechanical collapse (i.e. loss of postural tone).

In the absence of witnesses, information from the patient regarding prodrome, provocation and prior history can be useful; information from witnesses, particularly on the time to recovery will be extremely helpful (as this is a key factor to differentiate syncope from seizure). Where paramedics are involved, examine the ambulance notes for initial observations and review any prehospital ECGs. These are a great source of useful information that can be hard to locate later down the line and copies should be made when first seen. In most cases clinicians can establish whether the presenting problem was syncope, and therefore TLoC patients should not be labelled as 'collapse query cause'. This implies a lack of attention to the history of the event and leads to poor patient management, treatment and disposition decisions.

How should I approach the patient with syncope?

Firstly, the diagnosis of syncope should be established with some thought given to the ranking of likelihood of various causes. Secondly, any serious underlying diagnoses, both non-cardiac (e.g.

pulmonary embolism, ruptured abdominal aortic aneurysm) and cardiac (complete heart block on presenting ECG) should be sought. If the cause of the patient's syncope remains undiagnosed, then risk stratification of the patient should take place according to likely diagnosis. History is key (including witness history) and examination should include focused cardiovascular examination.

Risk assessment

The new ESC guidelines are very clear on risk assessment if the patient's syncope remains undiagnosed after initial assessment. Risk assessment is designed to decide whether a patient is likely to have reflex or postural syncope (low risk of serious outcome) or cardiac syncope (high risk of serious outcome). The guidelines provide a list of high and low-risk features that can be used for ED risk stratification**. [1]** These are summarized below:

Syncopal event

Low risk:

- Associated with prodrome typical of reflex syncope (e.g. light-headedness, feeling of warmth, sweating, nausea, vomiting)
- After sudden unexpected unpleasant sight, sound, smell, or pain
- After prolonged standing or crowded, hot places
- During a meal or postprandial
- Triggered by cough, defaecation, or micturition
- With head rotation or pressure on carotid sinus (e.g. tumour, shaving, tight collars)
- Standing from supine/sitting position

High risk (red flag):

Major

- New onset of chest discomfort, breathlessness, abdominal pain, or headache
- Syncope during the exertion (not after it has stopped), or when supine
- Sudden onset palpitation immediately followed by syncope

Minor (high risk only if associated with structural heart disease or abnormal Electrocardiogram; ECG):

- No warning symptoms or short (<10 s) prodrome
- Family history of Sudden Cardiac Death (SCD) at young age
- Syncope in the sitting position

Past medical history

Low risk:

- Long history (years) of recurrent syncope with low-risk features with the same characteristics of the current episode
- Absence of structural heart disease

High risk (red flag):

Major

- Severe structural or coronary artery disease (heart failure, low left ventricular ejection fraction; LVEF or previous myocardial infarction)
- Family history of sudden/early/unexplained death (may be the only indication of an inherited channelopathy. Whilst some have ECG evidence (e.g. long/short QT syndrome, Wolff-Parkinson-White Syndrome (WPW), Brugada syndrome) others have none (e.g. Catecholaminergic polymorphic ventricular tachycardia; CPVT)

Physical examination

Low risk:

- Normal examination

High risk (red flag):

- Unexplained systolic blood pressure (BP) in the ED <90 mmHg
- Suggestion of gastrointestinal bleed on rectal examination
- Persistent bradycardia (<40 beats per minute; bpm) in awake state and in absence of physical training
- Undiagnosed systolic murmur

ECG

Low risk:

- Normal ECG (Physician should seek advice if unsure).

High risk (red flag):

Major

- ECG changes consistent with acute ischaemia
- Mobitz II second- and third-degree atrio-ventricular (AV) block
- Slow Atrial Fibrillation (AF) (<40 b.p.m.)
- Persistent sinus bradycardia (<40 bpm), or repetitive sinoatrial block or sinus pauses >3 seconds in awake state and in absence of physical training
- Bundle branch block, intraventricular conduction disturbance, ventricular hypertrophy, or Q waves consistent with ischaemic heart disease or cardiomyopathy
- Sustained and non-sustained Ventricular Tachycardia (VT)
- Dysfunction of an implantable cardiac device (e.g. inappropriate shock from implantable cardioverter defibrillator; ICD, or dysfunctional pacemaker)
- ST-segment elevation with type 1 morphology in leads V1– V3 (Brugada pattern)

- QTc >460 ms in repeated 12-lead ECGs indicating long QT syndrome (LQTS)

Minor (high risk only if history consistent with arrhythmic syncope)

- Mobitz I second-degree AV block and 1° degree AV block with markedly prolonged PR interval
- Asymptomatic inappropriate mild sinus bradycardia (40–50 b.p.m.), or slow AF (40–50 b.p.m.
- Paroxysmal supraventricular tachycardia (SVT) or atrial fibrillation with rapid ventricular rates (especially in the elderly)
- Pre-excited QRS complex
- Short QTc interval (≤ 340 ms)
- Atypical Brugada patterns
- Negative T waves in right precordial leads, epsilon waves suggestive of arrhythmogenic right ventricular cardiomyopathy (ARVC)

Patients with prodrome, recurrent syncope, no structural heart disease, normal ECG, normal physical examination and no injury are at low-risk of serious short-term outcome. Patients with no associated prodrome or typical precipitating event, syncope when supine or during exertion, family history of sudden cardiac death at a young age, a past medical history including structural heart disease or an abnormal physical examination or ECG are at greater risk of cardiac syncope. Once ED risk stratification has been undertaken, the ESC ED risk stratification flowchart shown in **Figure 1** should be used to determine subsequent management. **[1]**

Clinical decision rules

There are many ED Clinical Decision Rules (CDRs) and risk stratification tools for syncope that use medical history, examination and ECG findings to stratify patients by their risk of developing both short (i.e. 7-30 day) and long-term (i.e. 1 year) serious outcomes. Examples of these include:

- ROSE rule **[4]**
- San Francisco syncope rule **[5,6]**
- OESIL **[7]**
- STePS **[8]**
- Canadian Syncope Risk Score **[9]**

It is worth nothing that none of these outperform clinical judgment, **[10]** tend to have low specificity, thus increasing admissions, and have been variably adopted. Some rules and tools have included age as a factor. While older patients are undoubtedly at higher risk of an adverse outcome after syncope, including age in such tools only reduces their specificity - leading to over admission.

Biomarkers

Although there is increasing interest in the use of biomarkers such as troponins and brain natriuretic peptides for ED syncope risk stratification, these cannot be recommended for routine care at present. **[11-15]**

Red flag features not to be missed

Patients with the following are at risk of cardiac syncope:

- No associated prodrome or typical precipitating event
- Syncope when supine or during exertion
- Family history of sudden cardiac death at a young age
- Past medical history including structural heart disease
- An abnormal physical examination or ECG

Exercise-associated syncope is defined as syncope occurring during exercise (syncope after exercise is

commonly reflex). Although most cases are benign (especially those associated with post-exercise collapse which are commonly reflex) patients with exercise-associated syncope include groups of patients at high risk of sudden death and conditions such as Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC), Brugada syndrome and Hypertrophic cardiomyopathy (HCM). Patients with trauma (commonly facial due to loss of consciousness, meaning they are unable to put their hand out) and those without prodromes and/or without apparent triggers and/or atypical presentation (termed non-classical reflex syncope forms) should be considered for further arrhythmia investigation even if they are of younger age. This is because arrhythmic syncope is associated with no or less than 3 seconds of prodrome, while the prodrome lasts up to 3 minutes in reflex syncope.

Does my patient need to be admitted to hospital?

About half of all patients who present to hospital with syncope will end up being admitted. This is likely to be due to a lack of supporting outpatient services (e.g. syncope clinical decision/ ED ambulatory unit or rapid access syncope clinic) and the concern of the clinician that the patient might be at risk of arrhythmic syncope. In fact, death within 7-30 days of ED attendance with syncope is infrequent at approximately 0.8%. **[1]** Non-fatal serious outcome (e.g. acute myocardial infarction, life-threatening arrhythmia, decision to implant a pacemaker or cardiac defibrillator, pulmonary embolus, cerebrovascular accident, intracranial haemorrhage, subarachnoid haemorrhage, haemorrhage requiring a blood transfusion etc.) within 7-30 days of ED attendance with syncope is about 10.5% although in two thirds of these patients the serious outcome was apparent in the ED. This suggests that many patients who are currently admitted could safely undergo a short period of ED monitoring plus selected echocardiography (if structural/ valvular heart disease or heart failure is suspected) in an ED clinical decision/ ambulatory unit, followed by urgent review by a syncope specialist in a rapid access syncope clinic. If this setup is not available then patients at risk of cardiac

syncope should not be discharged from hospital until advanced investigations such as echocardiography, ECG monitoring and review from an expert in syncope have been completed.

How should I ECG monitor my patient?

In addition to the 12-lead ECG, immediate ECG monitoring should be applied when there is a suspicion of arrhythmic syncope. The new ESC guidelines **[1]** support an increased role for prolonged ECG monitoring when arrhythmic syncope is suspected. Establishing a cardiac arrhythmia as the cause of syncope rests on correlating the arrhythmia with symptoms using monitoring devices, but these all have significant drawbacks. Cardiac arrhythmia investigation is usually initiated with the Holter monitor, but non-compliance and lack of extended monitoring reduces diagnostic yield to less than 20%. Event recorders can monitor over longer periods of time but must be activated and cannot detect asymptomatic arrhythmias. External continuous loop recorders are expensive, require electrodes and bulky recording devices, and produce a large amount of data, which requires sifting. Implantable loop recorders are expensive and necessitate an invasive surgical procedure.

There is also very little evidence to support how long patients suspected of having arrhythmic syncope should be monitored for, either in the hospital or outpatient setting. The optimum duration of hospital ECG monitoring after the index episode is unclear but is likely to lie between 4 and 24 hours. Hospital ECG monitoring should occur in an area in which resuscitation facilities are available. Various times for outpatient ECG monitoring have been suggested, from 24 hours to 28 days. The PATCH-ED study, which used an ambulatory ECG monitor in ED patients with unexplained syncope, identified a symptomatic significant arrhythmia in 1 in 10 patients and a diagnostic finding in 3 in 4. **[16]** In this study, a third of the significant and symptomatic significant arrhythmias were captured within the first 24 hours (suggesting a role for prolonged monitoring in the ED or in hospital). The

majority of the significant and symptomatic significant arrhythmias were captured in the first 7 days, but some significant arrhythmias (mainly non-serious and asymptomatic) were picked up between days 8 and 14.

Driving

There have been a number of high-profile cases of syncope while driving leading to serious consequences. **[17]** It is vital that all people presenting with syncope are assessed for and counselled with respect to their fitness to drive, and that this is detailed in their medical notes. Current local fitness to drive guidelines might not always be easily recalled but should be available to access in the ED. Note that whilst guidelines will be very different in every country (and often within different regions of the same country as in the USA), in the UK, any patient with suspected cardiovascular syncope, cough syncope or unexplained syncope and any Class 2 (Heavy Goods Vehicle) driver with vasovagal syncope must not drive from the time of their index presentation **[Figure 2]**. Patients who have been told to refraim from driving should be referred to a syncope specialist to confirm the diagnosis and receive ongoing driving advice.

Should my hospital have a syncope clinical decision unit?

The current use of observation wards and syncope clinical decision units is not widespread; for example only 27% of UK EDs have an observation ward that admits syncope patients. **[18]** The new ESC syncope guidelines promote the use of syncope clinical decision units within the ED. They allow a period of ECG monitoring for patients thought to be at risk of arrhythmic syncope and selected echocardiography if structural or valvular heart disease, or heart failure, is suspected. Shen et al **[19]** showed that a designated syncope unit in the ED, where patients could stay for up to 6 hours, significantly improved diagnostic yield in the ED and reduced hospital admission and total length of

hospital stay, without affecting recurrent syncope and all-cause mortality. Patients underwent continuous cardiac monitoring, hourly vital sign check, echocardiography in patients with abnormal cardiovascular examination findings or an abnormal ECG, tilt-table testing and electrophysiological consultation if indicated. Similarly, Sun et al **[20]** showed that an ED observation syncope protocol reduced admissions, length of hospital stay and index hospital costs, with no difference in safety events, quality of life, or patient satisfaction. Patients in this study received continuous cardiac monitoring, echocardiogram (for patients with a cardiac murmur on chest auscultation) and additional testing at the ED clinician's discretion. Guidelines on setting up a syncope clinical decision unit are also available through the ESC. **[21]**

Should my hospital have a rapid access syncope clinic?

The current use of specialist syncope outpatient clinic is also not widespread; for example only 18% of UK EDs have access to a specialist syncope outpatient clinic. **[18]** The new ESC syncope guidelines promote the use of rapid access syncope clinics as a safe way to reduce admissions and ensure patients receive timely, focused expert opinion and investigation. Setting up a syncope rapid access syncope clinic in your hospital requires a multidisciplinary team approach, including emergency medicine, acute medicine, care of the elderly, neurology, cardiology, electrophysiology, nursing, cardiac imaging and neurophysiology, keen enthusiasts (a syncope site champion) and a lot of energy. All these disciplines do not need to be co-located, and in the simplest form can be brought together in a virtual clinic joined through a well-constructed pathway that signposts referring ED, acute medical and GP clinicians to the right place for their patient - be that the TIA/ stroke clinic, neurology clinic, first seizure clinic, general cardiology clinic, electrophysiology clinic, admission or the rapid access syncope clinic. There are no recommendations as to the timing of when patients requiring syncope clinic follow-up should be seen but sooner the better. If the patient was not seen by a

syncope specialist in the ED observation facility or whilst an inpatient this should be on an urgent basis within 2 weeks.

Conclusion

Patients with syncope commonly present to the ED and present a major workup and disposition challenge. The 2018 European Society of Cardiology (ESC) syncope guidelines suggest an approach initially making a diagnosis of syncope and seeking an underlying cause. If no obvious underlying cause is found, risk stratification should take place occur to determine risk of adverse outcome. Red flag symptoms should be considered and implications for driving should be fully considered. Establishing a hospital syncope clinical decision unit and rapid access syncope clinic is likely to reduce admissions, reduce length of hospital stay and reduce hospital costs.

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Figure legends

Figure 1: Emergency department risk stratification flowchart to determine syncope patient management of syncope. SU, syncope unit. Reproduced from Brignole M, Moya A, de Lange FJ, et al, 2018 ESC Guidelines for the diagnosis and management of syncope, European Heart Journal 2018; 39 (21): 1883–1948, doi:10.1093/eurheartj/ehy037. **[1]** Reprinted by permission of Oxford University Press on behalf of the European Society of Cardiology. v1.4

Figure 2: UK Fitness to Drive in TLoC

(adapted from A. Hudson, S. Saunder, R. Grant, St. George's University Hospital, London and based on March 2018 UK Driving and Vehicle Licensing Authority; DVLA advice. 1 = UK Class 1 driver's licence, 2 = UK Class 2 Heavy Goods Vehicle driver's licence)

Figure 1:

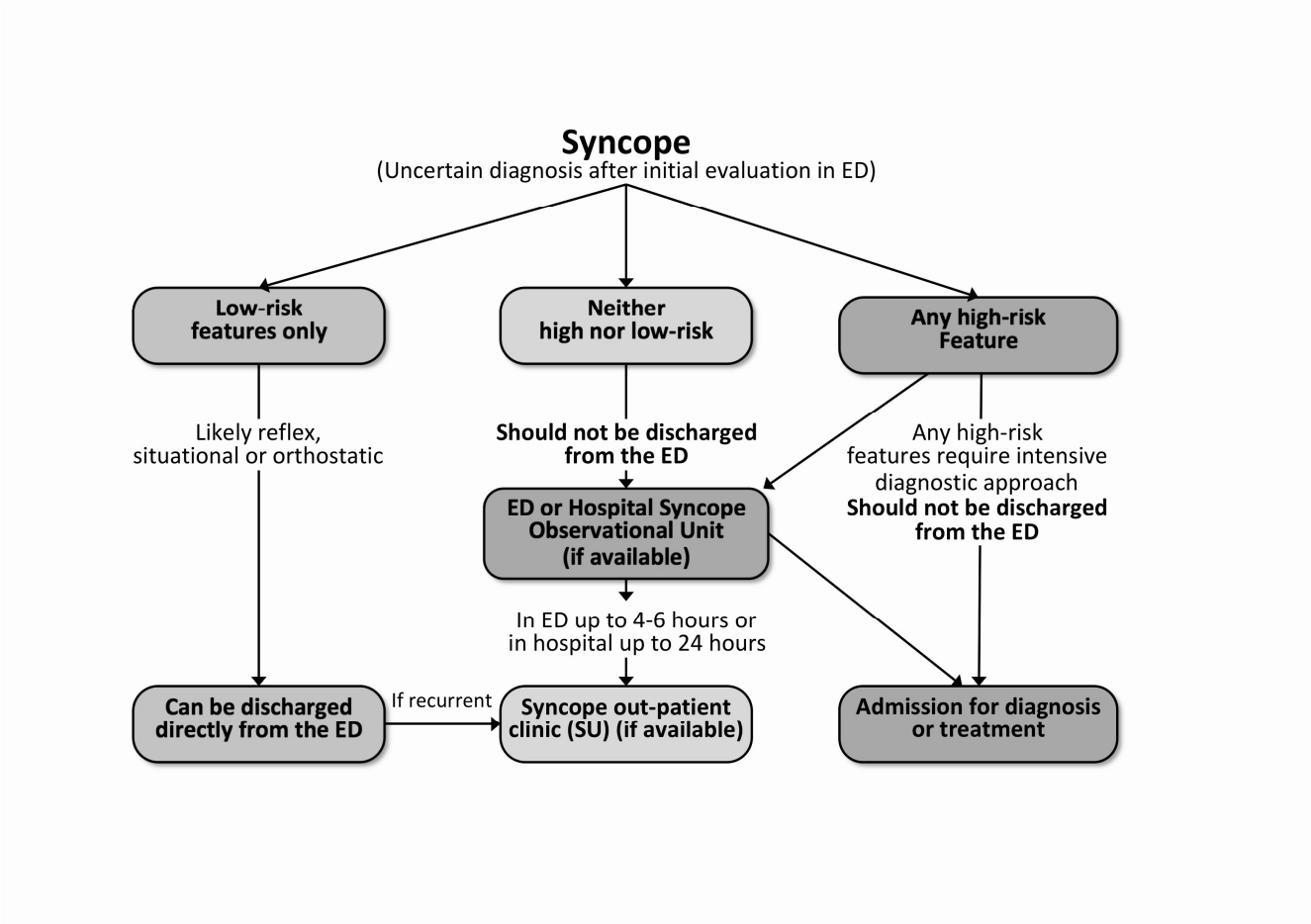
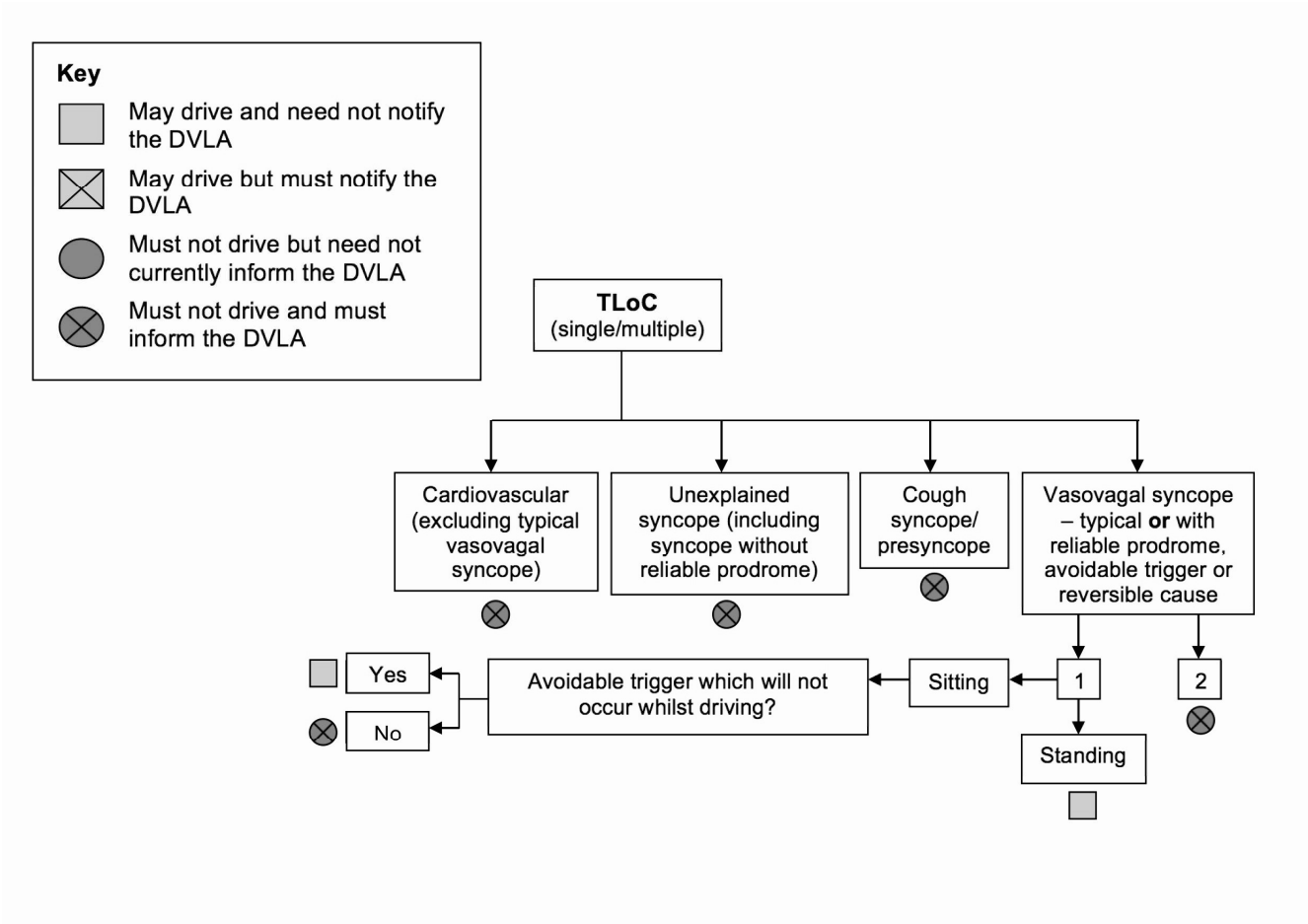

Syncope
(Uncertain diagnosis after initial evaluation in ED)
Low-risk features only
Neither high nor low-risk
Any high-risk Feature
Likely reflex, situational or orthostatic
Should not be discharged from the ED
Any high-risk features require intensive diagnostic approach
Should not be discharged from the ED
ED or Hospital Syncope Observational Unit (if available)
In ED up to 4-6 hours or in hospital up to 24 hours
Can be discharged directly from the ED
If recurrent
Syncope out-patient clinic (SU) (if available)
Admission for diagnosis or treatment

Figure 2:


Key
May drive and need not notify the DVLA
May drive but must notify the DVLA
Must not drive but need not currently inform the DVLA
Must not drive and must inform the DVLA
TLoC (single/multiple)
Cardiovascular (excluding typical vasovagal syncope)
Unexplained syncope (including syncope without reliable prodrome)
Cough syncope/ presyncope
Vasovagal syncope – typical or with reliable prodrome, avoidable trigger or reversible cause
1
2
Standing
Sitting
Avoidable trigger which will not occur whilst driving?
Yes
No